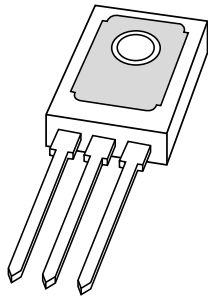


# DATA SHEET



## **BD136; BD138; BD140** PNP power transistors

Product specification  
Supersedes data of September 1994  
File under Discrete Semiconductors, SC04

1997 Mar 26

# PNP power transistors

# BD136; BD138; BD140

### FEATURES

- High current (max. 1.5 A)
- Low voltage (max. 80 V).

### APPLICATIONS

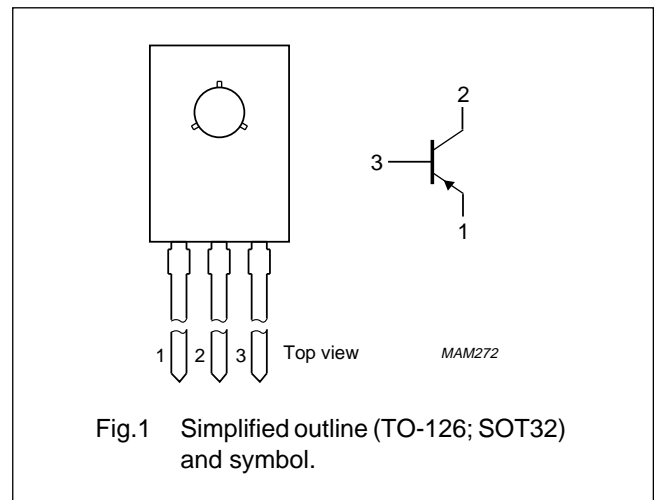
- General purpose power applications, e.g. driver stages in hi-fi amplifiers and television circuits.

### DESCRIPTION

PNP power transistor in a TO-126; SOT32 plastic package. NPN complements: BD135, BD137 and BD139.

### PINNING

PIN	DESCRIPTION
1	emitter
2	collector, connected to metal part of mounting surface
3	base



### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter				
	BD136		–	–	–45	V
	BD138		–	–	–60	V
$V_{CEO}$	collector-emitter voltage	open base				
	BD136		–	–	–45	V
	BD138		–	–	–60	V
	BD140		–	–	–80	V
$I_{CM}$	peak collector current		–	–	–2	A
$P_{tot}$	total power dissipation	$T_{mb} \leq 70\text{ °C}$	–	–	8	W
$h_{FE}$	DC current gain	$I_C = -150\text{ mA}; V_{CE} = -2\text{ V}$	40	–	250	
$f_T$	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$	–	160	–	MHz

## PNP power transistors

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**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter			
	BD136		–	–45	V
	BD138		–	–60	V
	BD140		–	–100	V
V <sub>CEO</sub>	collector-emitter voltage	open base			
	BD136		–	–45	V
	BD138		–	–60	V
	BD140		–	–80	V
V <sub>EBO</sub>	emitter-base voltage	open collector	–	–5	V
I <sub>C</sub>	collector current (DC)		–	–1.5	A
I <sub>CM</sub>	peak collector current		–	–2	A
I <sub>BM</sub>	peak base current		–	–1	A
P <sub>tot</sub>	total power dissipation	T <sub>mb</sub> ≤ 70 °C	–	8	W
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	junction temperature		–	150	°C
T <sub>amb</sub>	operating ambient temperature		–65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R <sub>th j-a</sub>	thermal resistance from junction to ambient	note 1	100	K/W
R <sub>th j-mb</sub>	thermal resistance from junction to mounting base		10	K/W

**Note**

1. Refer to TO-126 (SOT32) standard mounting conditions.

PNP power transistors

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**CHARACTERISTICS**

$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = -30\text{ V}$	-	-	-100	nA
		$I_E = 0; V_{CB} = -30\text{ V}; T_j = 125\text{ }^\circ\text{C}$	-	-	-10	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -5\text{ V}$	-	-	-100	nA
$h_{FE}$	DC current gain	$V_{CE} = -2\text{ V}$ ; see Fig.2				
		$I_C = -5\text{ mA}$	40	-	-	
		$I_C = -150\text{ mA}$	40	-	250	
$h_{FE}$	DC current gain BD136-10; BD138-10; BD140-10 BD136-16; BD138-16; BD140-16	$I_C = -500\text{ mA}; V_{CE} = -2\text{ V}$ ; see Fig.2				
			63	-	160	
			100	-	250	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	-	-	-0.5	V
$V_{BE}$	base-emitter voltage	$I_C = -500\text{ mA}; V_{CE} = -2\text{ V}$	-	-	-1	V
$f_T$	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -5\text{ V}; f = 100\text{ MHz}$	-	160	-	MHz
$\frac{h_{FE1}}{h_{FE2}}$	DC current gain ratio of the complementary pairs	$ I_C  = 150\text{ mA};  V_{CE}  = 2\text{ V}$	-	1.3	1.6	

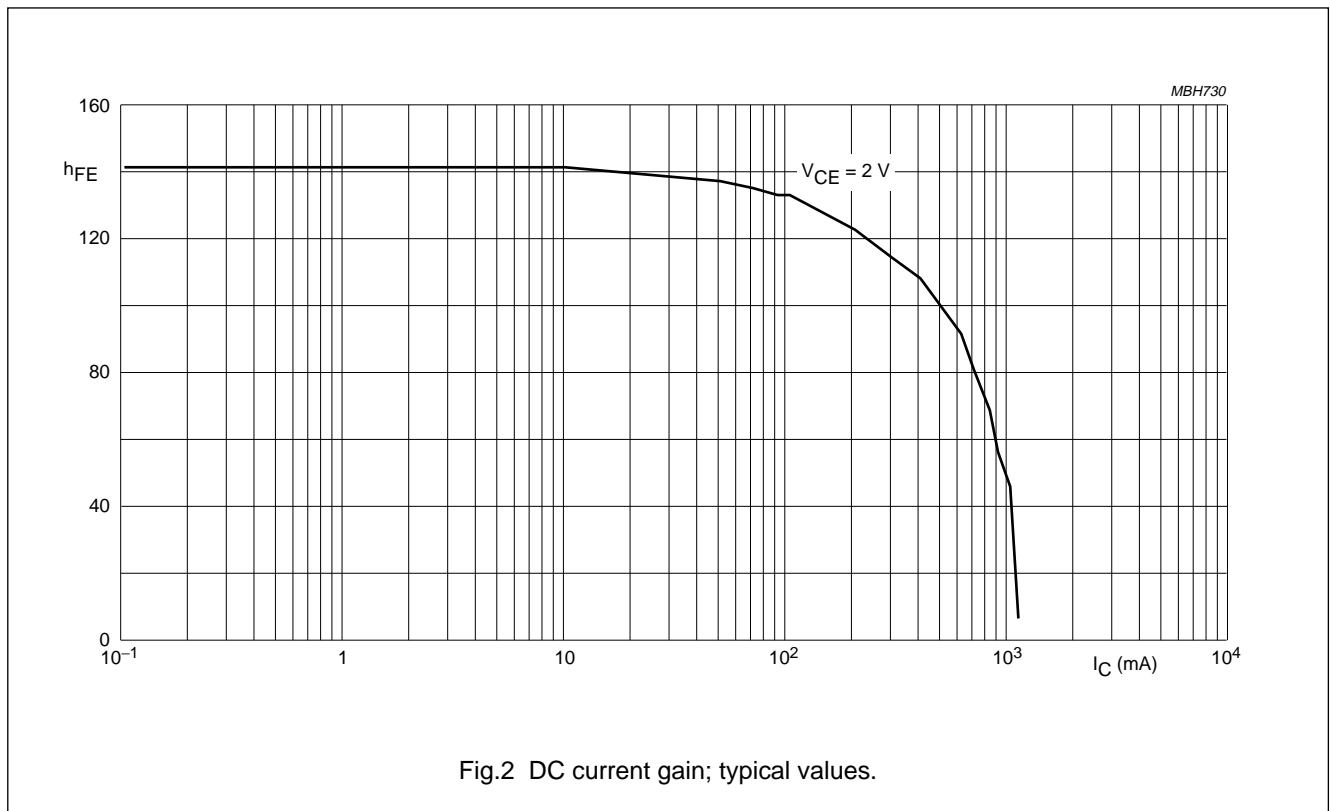


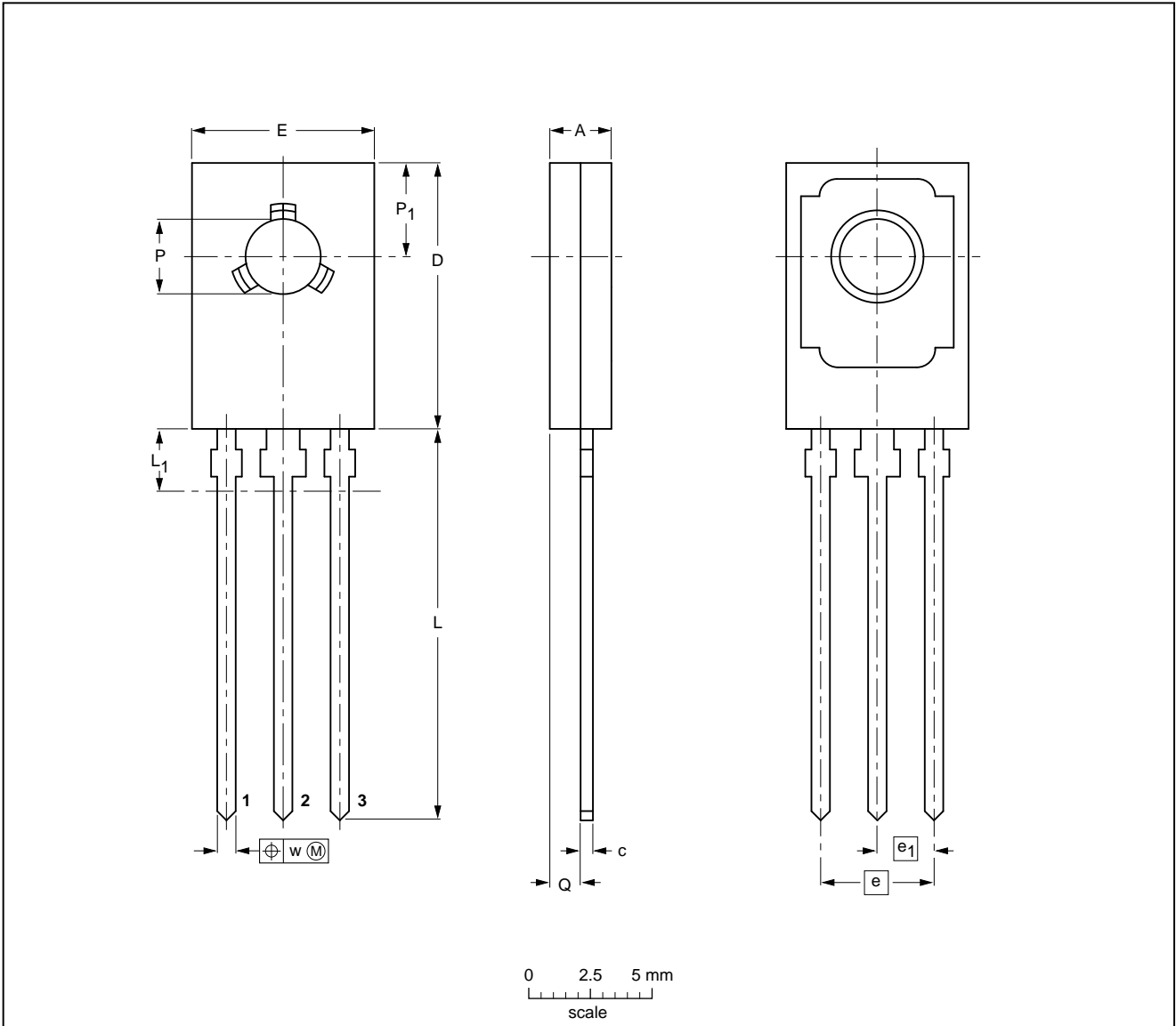
Fig.2 DC current gain; typical values.

PNP power transistors

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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; mountable to heatsink, 1 mounting hole; 3 leads SOT32



DIMENSIONS (mm are the original dimensions)

UNIT	A	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup> max	Q	P	P <sub>1</sub>	w
mm	2.7 2.3	0.88 0.65	0.60 0.45	11.1 10.5	7.8 7.2	4.58	2.29	16.5 15.3	2.54	1.5 0.9	3.2 3.0	3.9 3.6	0.254

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT32		TO-126				97-03-04

## PNP power transistors

## BD136; BD138; BD140

**DEFINITIONS**

<b>Data Sheet Status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

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PNP power transistors

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